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Comparing Cost Uplift in Infrastructure Delivery Methods:

A Case Based Approach

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ABSTRACT

The alliance project delivery method is used for approximately one third of all Australian government infrastructure projects representing $8-$10 billion per annum. Despite its widespread use, little is known about the differences between estimated project cost and actual cost over the project lifecycle. This paper presents the findings of research into 14 Australian government alliance case studies investigating the observed cost uplift over each project's lifecycle. I find that significant cost uplift is likely and that this uplift is greater than that afflicting traditional delivery methods. Furthermore, most of the cost uplift occurs at a different place in the project lifecycle, namely between Business Case and Contractual Commitment.

Because Australian governments have finite resources, they employ formal capital rationing methods in prioritising funds between competing investment proposals presented by the various government agencies (Department of Treasury and Finance, Victoria 2010). The decision to support or not support a particular investment proposal is based on a balanced judgment of the costs and risks against the service benefits to the community that is documented in an investment proposal. These investment proposals are analysed, quantified and articulated in Business Cases which outline the merits of the investment proposal, along with a thorough analysis of estimated capital costs, operational costs, risks and benefits.

The absence of a robust and comprehensive Business Case is, therefore, problematic for Government since it may lead to misallocation of its limited funds. In particular, where investment proposals involve major physical infrastructure, the existence of significant cost uplift (i.e. where the actual cost exceeds the Business Case estimate of project cost) raises serious doubts about the basis of the original investment decision. Put more simply, a significant under-estimation of the project cost could mean that an alternative project or service should have been commissioned or that the project itself should never have been built.

Government procurement of physical infrastructure in Australia has largely been based on the principle of transparency. Consequently, most infrastructure projects have been delivered using traditional competitive bidding processes. As the Australian construction industry has evolved, however, so too have delivery methods. Early traditional methods such as Design-Bid-Build (DBB), as

well as Design and Build (DB), are now supplemented by Public Private Partnerships (PPPs) and more recently Alliancing (Department of Treasury and Finance, Victoria 2009).

These traditional delivery methods involved price competition between constructors based on documented technical drawings and specifications, commercial conditions of contract and structured payment systems. A common characteristic of traditional methods is that project delivery risks are, to varying degrees, allocated to the constructor.

The resulting formal contractual arrangements sometimes created an unproductive positional relationship between the 'buyer' and the 'seller', leading to adversarial relationships and litigious outcomes. To overcome these litigious outcomes, the US Army Corps of Engineers examined alternative delivery methods to reduce litigation and disputes. They were interested in developing a delivery method that could save time and money, provide flexibility of response to disputes and protect the relationship between the 'buyer' and 'seller' (US Army Corps of Engineers 1991).

Further work (with the assistance of the private sector) led to the first partnering model. Partnering was promoted as disputes-prevention (as opposed to disputes-resolution) and aimed to improve communication, increase quality and efficiency, achieve on-time performance, improve long-term relationships and enable a fair profit and prompt payment for the contractor. It was neither a contractual agreement, nor legally enforceable (US Army Corps of Engineers 1991). The alliance delivery model is an extension to partnering and was first used in the oil and gas fields of the North Sea by British Petroleum (BP) in the early 1990s (Department of Treasury and Finance, Victoria 2009).

Australia embarked upon its first project using the alliance delivery method in 1994 being the Wandoo Alliance in Western Australia (Department of Treasury and Finance, Victoria 2009). Since then, the use of alliancing has enjoyed significant growth and it has emerged as a mainstream delivery method in Australia (see Figure 1 below - Department of Treasury and Finance, Victoria 2009). Alliancing's core features include; a collective assumption of risk by Owners, Contractors and Designers rather than the allocation of risk associated with traditional delivery methods (DBB, DB and PPP), a legal agreement between the parties that reflects "no blame; no suit" and joint management of

the project (by the Owner and Contractor) with unanimous decision making directed to achieving the common goal of "best for project" (Department of Treasury & Finance, Victoria 2009). The collective assumption of the risk is "... fundamental to understanding the alliance culture" and refers to the aspiration that all parties assume (and manage) project delivery risks rather than assigning to any one party (Department of Treasury and Finance, Victoria 2009).

Insert Figure 1 about here

In the period 2004-2009 the total value of government alliance projects in Australia was $32 billion, representing approximately one third of all public sector infrastructure projects (Department of Treasury and Finance, Victoria 2009). Despite this rapid rise in an innovative delivery method, there is a notable dearth of research into the pricing outcomes and negotiation behaviours involved in alliancing. The objective of this paper is to address this gap in our knowledge.

This lack of empirical evidence about large infrastructure delivery is not new. In 2003 Flyvbjerg, Skamris Holm and Buhl noted that "despite the ..... enormous sums of money being spent on infrastructure, surprisingly little systematic knowledge exists about the costs, benefits and risks involved". Flyvbjerg et al examined cost uplift in 258 infrastructure projects across the USA and Europe ranging in value from $1.5 million to $8.5 billion; all of which were completed between 1927 and 1998. They found that "underestimation of costs at the time of decision to build is the rule rather than the exception" and that the average cost uplift was 28% for all project types (road, rail, tunnel/bridges). They also found that lengthy and protracted implementation phases translated into risks of substantial cost uplift as did project size and ownership (Flyvbjerg et al 2004).

Other researchers have found a similar pattern of cost uplift. Odeck (2004) investigated cost uplift for Norwegian road projects in the period 1992-1995 and reported a mean overrun of 7.9% (ranging from -59% to +183%) with cost overruns being more prevalent on smaller projects. Contrary to Flyvbjerg et al, he found no influence of project type (road, rail etc) on the cost overrun.

Ibbs, Kwak, Ng and Odabasi (2003) took another perspective on cost uplift by comparing the average amount of uplift for DBB against DB. Their particular interest was the impact of change on

project productivity (i.e. cost uplift) and the merits of one delivery method compared to another. The methodology involved self assessment by the Project Manager on 67 projects across the USA ranging in size from $5 million to $1 billion. They found that cost uplift was approximately 13-15% but with little difference between DB and DBB.

In the Australian context, Duffield, Raisbeck and Xu (2008) benchmarked Australian PPP projects against traditional (DBB and DB) projects and, from a sample of 67 projects (including 63 infrastructure projects), found that the cost uplift from budget approval to completion was 86% for PPPs and 20% for DBB/DBs. Duffield et al also compared their findings to various other researchers including the Treasury Taskforce (2000), National Audit Office (2003), Mott MacDonald (2002) and Allen Consulting (2007) which to varying degrees and using different methodologies examined cost uplift and traditional (DBB, DB and PPP) delivery methods. A consistent finding amongst these researchers being that significant cost uplift occurred for all traditional methods.

In the international context, Hodge and Greve, (2007) reviewed the performance of PPP projects and their public policy implications. They found that "... a range of ... successes and failures can be seen around the globe...." and that there was "... insufficient research to be fully informed on outcomes (of PPPs) to date".

While there is some modest research on the question of cost uplift, the causes are not well understood. Despite criticisms of a biased methodology that was said to favour PPPs (Unison 2005), Mott MacDonald (2002) concluded that there is a systematic tendency for project appraisers to be overly optimistic. On the strength of this report, the British Treasury recommended that explicit adjustments be made to estimates of project's costs to account for this "Optimism Bias" (HM Treasury 2003). Similarly, the British Department for Transport has published a guidance document (prepared by Flyvbjerg) on the uplift to be applied to capital cost estimates for transport projects at the time of Business Case preparation (British Department of Transport 2004).

A problem common to all of the above researchers was lack of access to suitable objective data and defining a common starting point for the commencement of cost uplift. For instance, Flyvbjerg et al (2004) noted that "... in most cases it is virtually impossible to identify the .... real decision date"

and associated cost estimate. Caution therefore needs to be exercised on comparing cost uplift between different researchers. Table 1 summarises the research into cost uplift.

Insert table 1 about here

Little has changed since Flyvbjerg et al (2003) commented on our lack of knowledge of cost uplift. There has been little reported research into the issue, although the research that has been undertaken is largely consistent in finding that significant cost uplift occurs between the Business Case estimate (sometimes described as the 'Decision to Build" (Creedy 2006)) and project completion. Most researchers have focussed their attention on the correlation between quantum of cost uplift and project type (road, rail etc) with little research on possible correlation between cost uplift and the delivery method. Only Flyvbjerg has systematically addressed cost uplift causation, as distinct from correlation. There is no reported research on cost uplift – either quantum or causation - when the alliance delivery method is used.

This is a potentially serious shortcoming for decision makers given that, as noted earlier, cost uplift is significant in the original investment decision and that one third of all Australian Government infrastructure projects used the alliance delivery method. Therefore, my research questions are:

RQ1: Is cost uplift likely in publicly funded alliance projects in Australia?

RQ2: If there is cost uplift in alliances, is it greater than that observed in other delivery methods (DB, DBB and PPP) and, if so, when?

METHODOLOGY

The research questions involve both specific (i.e. is there cost uplift?) and broad (i.e. when does it occur) components. Therefore I chose a method that provided detailed or "thick" data (Yin 2004). I chose to undertake a mixed method confidential case study approach using both qualitative and quantitative data because (1) the confidential case study method enables in-depth exploration of the data, incorporating specific context and environmental facts that cannot be adequately addressed in a purely quantitative study (Yin 2004), (2) a mixed method study could "provide more rounded evidence in support of its conclusions and recommendations" (Bourn 2007) and (3) a mixed method

provided for the triangulation of evidence from "people as well as documentary sources" (Bourn 2007).

I selected fourteen cases for in-depth analysis. This allowed me to incorporate a full range of evidence types including documents, archival records, interviews and observations. This enabled the consideration of a broad range of historical, attitudinal and observational issues and also allowed for the inclusion of context and was suited to our research questions. Ethical clearance from University of Melbourne was obtained that involved de-identifying the participants and projects was obtained. In some instances this meant some identifying detail was removed from the data presented in this article.

In summary, the case study analysis allowed me to (1) explore and understand key factors and contextual influences on any cost uplift in individual alliances, (2) explore, understand and identify areas of possible difference between traditional (DBB, DB and PPP) projects and alliances in so far as they may impact cost uplift and (3) explore and understand where cost uplift was experienced by individual project. The methodology is summarised in Figure 2.

Insert figure 2 about here

Phase 1: Purposive Sampling

The sampling frame for the project was based on a list of all known current and past Australian alliance projects provided by the Alliancing Association of Australasia (AAA). Since I was interested in large publicly funded infrastructure projects, I assessed this list against three key criteria, namely that the project was a government alliance project; that it was procured within the last five years; and that it was valued over $100 million.

Seventy-one alliance projects were within the research parameters. All Alliance Leadership Team members of these projects were approached by a combination of email and telephone to take part in an internet based survey that posed questions on alliance agreement format, perceived alliance performance, Target Outturn Cost comparison, project duration, activities undertaken prior to selecting an alliance, successful outcome indicators, the possibility of using alternative delivery methods; and the use of cost criteria in the evaluation. Participants were also asked about the name and composition

of alliance members. In line with other surveys within the infrastructure industry I used a five-point Likert scale (Sclove 2001) to rate these attributes.

Respondents were grouped into two categories, Owners and Non-Owner Participants (NOPs), with NOPs comprising constructors and designers. Eighty-two responses were received from 46 alliances, with 35 Owner responses and 47 NOP responses (of which 25 were constructors and 22 were designers). This response rate equated to 64% of the 71 alliances. Responses were received from projects located in Victoria (18%), New South Wales (24%), Queensland (45%), and Western Australia (13%).

Phase 2: Case Study Analysis

Since I was interested in studying a broad range of alliance projects, I decided to use maximum variation purposive sampling. This involved selecting cases base on performance (good versus poor), sector (road, rail, water), NOP selection processes (non-price and price), location (state) and complexity (program versus project alliances). Since the study focused on cost uplift, I only included projects that were completed or well progressed. A summary of the cases is provided in Table 2.

Insert Table 2 about here

The case studies were conducted through a mixture of face to face interviews with key alliance Owner and Non-owner personnel, and a detailed review of associated project documentation. Consistency was achieved throughout the interviews by maintaining, to the maximum extent practicable, the same interview leader and the use of a structured set of interview topics. Given the scale of the research, a number of investigators conducted interviews. Some of these research team members had participated in varying roles in some of the alliances studied (advisor to the Owner, the NOPs or the alliance). To increase the integrity of the research, internal processes were implemented to ensure there were several peer reviews of all findings.

Each stage of the project lifecycle was analysed to determine actual performance and compared, where possible, to the Business Case and the Target Outturn Cost (TOC). The Research Team noted that some of these alliances were part of a broader project undertaken by the same Owner and after

review it was determined that they were sufficiently independent (different objectives, different scope of work, different NOPs, different commercial frameworks, different selection processes etc.) that they could be considered as individual case studies for the purpose of this research.

RESULTS

The following sections detail the results of the analysis into cost uplift. Specifically, the key findings are interspersed with the limited existing literature so as to provide a holistic framework for understanding cost uplift in Australian public infrastructure alliances that builds on current knowledge. This aligns well with the qualitative methodology outlined (Eisenhardt, 1989; Suddaby, 2006) and follows the series of research questions.

Owners used non-price processes to select their alliance partners (with subsequent negotiation of TOC) in 40 of the 46 (85%) alliances for which responses were received in the purposive sampling undertaken in Phase 1. This non-price selection and negotiation process was similar for all of these 40 alliances and involved the following essential sequential steps which are also shown diagrammatically on Figure 3:

Step 1. The estimate of the project cost is prepared as part of the Business Case;

Step 2. The Business Case (BC) is approved by the government (generally Treasury and a sponsoring government department);

Step 3. The preferred alliance non-owner participants (NOPs) are selected using non-price criteria (typically this decision is based on corporate and individual capability and experience);

Step 4. The Target Outturn Cost (TOC) is negotiated by the government with the NOPs; the TOC represents the best estimate of the outturn project cost and is used as the basis from which any cost savings or overruns are ultimately shared between the Owner (government) and partners in the alliance (NOPs).

Step 5. If the Owner (government) requests any changes of scope (additions or deletions to the project) the negotiated TOC is adjusted accordingly and becomes the Final TOC;

Step 6. This Final TOC is compared to the Actual Outturn Cost at completion (AOC) and any cost underrun or cost overrun is shared between Owner (government) and the other alliance partners (NOPs).

Insert figure 3 about here

As Figure 3 illustrates, Alliances differ from more traditional delivery methods (DB, DBB and PPP) in three major ways. First, in alliances, the asset owners (government) select the Designer and Contractor (the alliance partners or NOPs) using non-price selection rather than a competition with tendered price as the dominant selection criteria. Second, owners negotiate the outturn price (TOC) with the designer and contractor (NOPs) rather than accepting a competitively tendered project price. Finally, Contractual Commitment (CC) between the Owner and NOPs occurs after price (TOC) negotiation rather than after accepting a competitively tendered outturn price.

To allow for a comparison between alliances and different project delivery types, Figure 3 shows the commonly used milestones in the literature for the project lifecycle. 'Decision to build' in a traditional project equates to Business Case in an alliance, 'Contractual Commitment' in a traditional project equates to agreeing the TOC or accepting a competitively tendered price and 'actual costs on project completion' in a traditional project equates to Actual Outturn Cost (AOC).

Cost Uplift under the Alliance Delivery Method

Observed cost uplift in the 14 alliance case studies plotted against the project lifecycle is shown in Figure 4. In fact, all cases experienced cost uplift. The 50% cost uplift at project completion shown on this figure represents the arithmetic mean of the 14 case studies with 10 of the 14 case studies between 25% and 95% uplift and none negative. Thus, the first research question is answered in the affirmative: **cost overruns are likely under the alliancing delivery method.**

Insert Figure 4 about here

To better understand the nature of cost uplift, the evolving cost estimates were analysed over the lifecycle of the alliance project.

Business Case to Contractual Commitment

During this stage of the project lifecycle, the Business Case has been approved, the owner (government) has selected preferred alliance partners and negotiated a TOC. The parties contractually commit to this TOC via an alliance legal agreement (Contractual Commitment). As Figure 4 indicates, the majority of the cost uplift occurs in this stage. The arithmetic mean of the cost uplift of the 14 case studies in this stage was 40% (of a total uplift of 50%) and 10 of the 14 case studies experienced an uplift of between 25% and 100% in this stage. There was no decrease from the Business Case estimate for any case studied.

Contractual Commitment to Final Target Outturn Cost

After the initial TOC is negotiated at Contractual Commitment it is (generally) only subject to adjustment if the owner (i.e. government) changes the physical scope of the project. The final TOC represents the net sum of any such adjustments and is the basis against which the Actual Outturn Cost (AOC) is compared to calculate the share of the savings or overrun between the owner (government) and alliance partners.

The arithmetic mean of the cost uplift for the 14 case studies in this stage was 10% (of the total 50%) with 9 out of the 14 case studies reporting uplifts of between 0% and 25%.

Final TOC to Actual Outturn Costs (AOC)

There were no observable under/overruns between the Final TOC and the Actual Outturn Cost (AOC). The arithmetic mean of the cost uplift for the 14 case studies in this stage was 0% (nil) with 12 out of the 14 case studies between -3% and +2%.

Alliance Cost Uplift Compared with Alternative Delivery Methods (DB, DBB and PPP)

Given the substantially higher cost uplifts evident in the preceding analysis, the next step was to compare the timing of cost uplifts across delivery methods. The results are presented in Figure 5. Flyvbjerg et al (2003) observed project uplift findings are presented as points on the far right of the diagram as he does not provide details of where the uplift occurs during the project lifecycle.

Insert Figure 5 about here

The evidence suggests that greater cost uplift in alliances is more likely to occur earlier in the project lifecycle compared with traditional cost uplifts (DBB, DBB and PPPs). This varies significantly from the assumption of linearity of increasing costs across the project lifecycle that informs the procedures of the British Department for Transport (2004). In fact, there is a decreasing or log function shape to the relationship indicating different causal factors of cost overruns. Thus, the findings also clearly answer the second part of the research question in the affirmative: **Alliances are likely to suffer greater cost uplift than other delivery methods (DB, DBB and PPPs)**.

CONCLUSION

Within the limitations of this research, the findings suggest that alliance projects experience a cost uplift of approximately 50% from Business Case to Project Completion. The direction of this uplift is similar to that found by previous researchers but is significantly higher for alliances than that reported for traditional delivery models (DB, DBB and PPP).

This research has also found that most (40% of the 50%) of the uplift occurs between Business Case (the Decision to Build) and negotiating the Target Outturn Cost (Contractual Commitment). This finding stands in contrast to the (limited) existing research which has found that for traditional projects most cost uplift occurs between Contractual Commitment and Project Completion. These findings raise several potential topics for future research; what are the causal factors behind the cost uplift observed in alliances and what are appropriate mitigation strategies.

The causes of cost uplift in infrastructure projects are not well understood. For traditional projects these causes are believed to be Optimism Bias and Strategic Misrepresentation. (Mott MacDonald 2002, Flyvbjerg et al 2006). It is not known if these same causal factors also afflict alliances but the findings suggest additional causal factor(s) are at play which may explain the differences to traditional projects in terms of both the additional cost uplift and the earlier stage in the project lifecycle at which the cost uplift occurs.

There are three reported and relevant mitigation strategies for dealing with cost uplift in infrastructure projects; explicit upward adjustment to the Business Case estimate (British Department

of Transport 2004), formal benchmarking of individual corporate performance (Siemiatckyl 2007) and the creation of an institutional culture that rewards accurate cost estimates (Flyvbjerg et al 2007, British Department of Transport 2004). These strategies are complementary and each seeks to address the two known causal factors of Optimism Bias and Strategic Misrepresentation. However, if, as is suggested above, additional causal factors afflict alliances, these current mitigation strategies are likely to be of limited use in addressing the serious problems of cost uplift when the alliance delivery method is used.

REFERENCES

Allen Consulting Group, Duffield, CF and Raisbeck, P. (2007). Performance of PPPs and Traditional Procurement in Australia. Melbourne, Infrastructure Partnerships Australia: 57.

Bazerman, M. H., & Tsay, C.-J. (2009). A Decision-making Perspective To Negotiation: A Review Of The Past And A Look Into The Future. Harvard Business School , pp.1-16.

Bourn, J. (2007). Public Sector Auditing, Is it Value for Money? John Wiley & Sons Ltd, England.

British Department for Transport (2004). Procedures for dealing with Optimism Bias in Transport Planning, Guidance Document.

Creedy G. (2006). Risk Factors Leading to Cost Overrun in the Delivery of Highway Construction Projects, PhD Thesis, Queensland University of Technology.

Department of Treasury and Finance, Victoria (2009) Benchmarking Study Into Alliancing in The Australian Public Sector. Evans & Peck and Melbourne University.

Department of Treasury and Finance, Victoria (2010) Investment Management Guidelines. Melbourne, Victoria, Australia.

Duffield, C. and Raisbeck, P. And Xu M. (2008). Report On The Performance Of PPP Projects In Australia When Compared With A Representative Sample Of Traditionally Procured Infrastructure Projects. National PPP Forum.

Eisenhardt, K. (1989) Building Theories from Case Study Research. The Academy of Management Review, Vol. 14, No. 4, pp. 532-550.

Flyvbjerg, B. (2006). From Nobel Prize To Project Management: Getting Risks Right. Project Management Journal , Vol.37 (3), pp.5-15.

Flyvbjerg, B., Skamris Holm, M. K., & Buhl, S. L. (2003). How Common And How Large Are The Cost Overruns In Transport Infrastructure Projects? Transport Reviews , Vol.23 (1), pp.71-88.

Flyvbjerg, B., Skamris Holm, M. K., & Buhl, S. L. (2002). Underestimating Costs In Public Works Projects: Error Or Lie? Journal Of The American Planning Association , Vol.68 (3), pp.279-295.

Flyvbjerg, B., Skamris Holm, M. K., & Buhl, S. L. (2004). What Causes Cost Overrun In Transport Infrastructure Projects? Transport Reviews, Vol.24 (1), pp.3-18.

Hale, D. R., Shrestha, P. P., Gibson Jr., G., & Migliaccio, G. C. (2009). Empirical Comparison Of Design/Build And Design/Bid/Build Project Delivery Methods. Journal Of Construction Engineering And Management , Vol.135 (7), pp.579-587.

HM Treasury (2003) The Green Book. Appraisal and Evaluation in Central Government.

Hodge, G.A. and Greve, C. (May/June 2007). Public-Private Partnerships: An International Performance Review. Public Administration Review.

Ibbs, C. W., Kwak, Y. H., Ng, T., & Odabasi, A. M. (2003). Project Delivery Systems And Project Change: Quantitive Analysis. Journal Of Construction Engineering And Management , Vol.129 (4), pp.382-387.

Mott MacDonald (2002, July). Review Of Large Public Procurement In The UK.

National Audit Office NAO (2003) PFI: Construction Performance – Report by the Comptroller and Auditor General, UK Audit Office, HC 371 Session 2002-2003.

Odeck, J. (2004). Cost Overruns In Road Construction- What Are Their Sizes And Determinants? Transport Policy, Vol.11 (1), pp.43-53.

Sclove, S.L. (2001). Notes on Likert Scales. www.uic.edu/classes/idsc/ids270sls/likert.htm

Suddaby, R. (2006) What grounded theory is not. Academy of Management Journal. Vol. 49, No. 4, 633–642.

Treasury Taskforce Limited. (2000) Value for money drivers in the Private Finance Initiative. Report prepared by Arthur Andersen and Enterprise LSW, HM Treasury, London, UK.

Tversky, A., & Kahneman, D. (1974). Judgement Under Uncertainty: Heuristics And Biases. Science, New Series , Vol.185 (4157), pp.1124-1131.

UNISON (October 2005), The Private Finance Initiative: A Policy Built on Sand, A report for UNISON by Prof. Alyson Pollock, David Price and Stewart Player, Public Health Policy Unit, UCL.

US Army Corps of Engineers. (1991) Partnering , Pamphlet 4, IWR Pamphlet-91-ADR-P-4.

Wachs, M. (1989). When Planners Lie With Numbers. Journal Of The American Planning Association, Vol.55 (4), pp.476-479.

Wee, B. V. (2007). Large Infrastructure Projects: A Review Of The Quality Of Demand Forecasts And Cost Estimations. Environment And Planning B: Planning And Design , Vol.34, pp.611-625.

Yin, R.K. (2004). Case Study Research - Design and Method. Sage Publications, Beverley Hills, CA.

Figure 1: Use Of Alliancing Delivery Method For Infrastructure In Australia 1996-2009

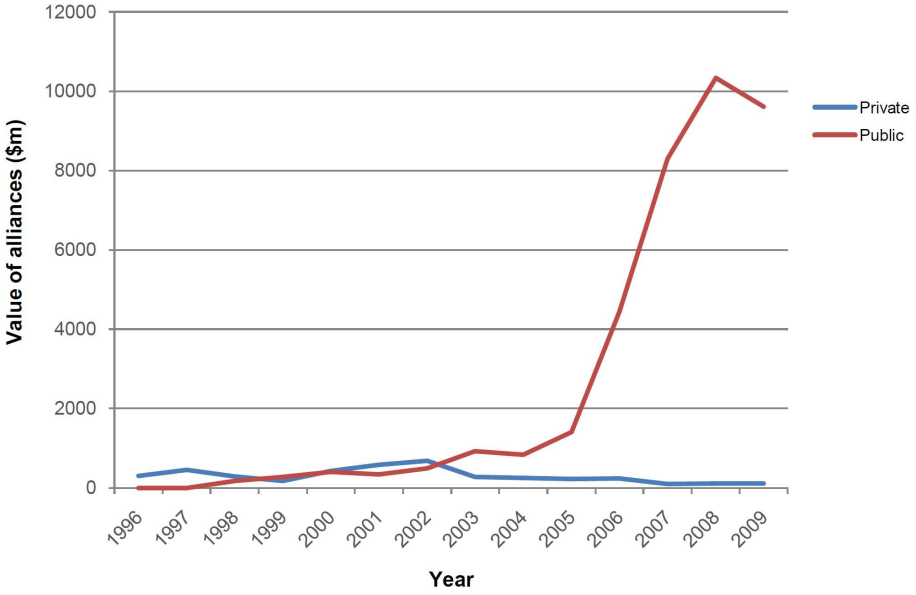


Figure 2: Summary Of Research Methodology

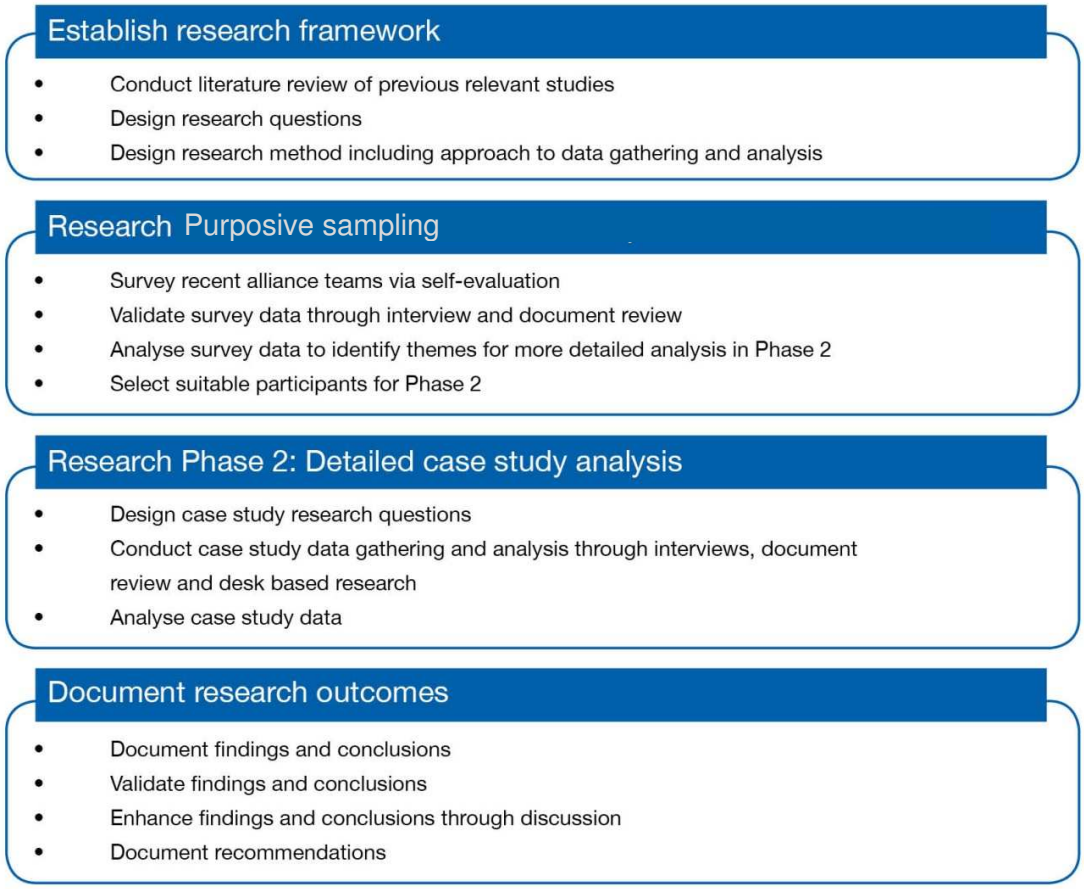


Figure 3: Simplified Diagrammatic Representation Of The Alliance Lifecycle

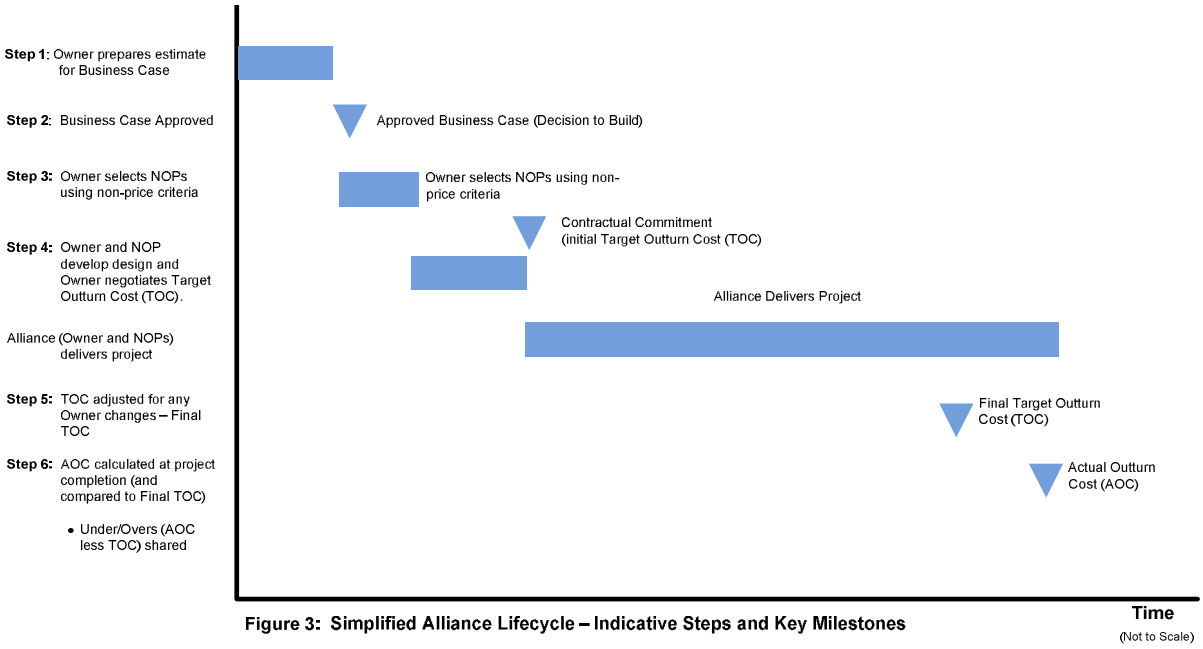
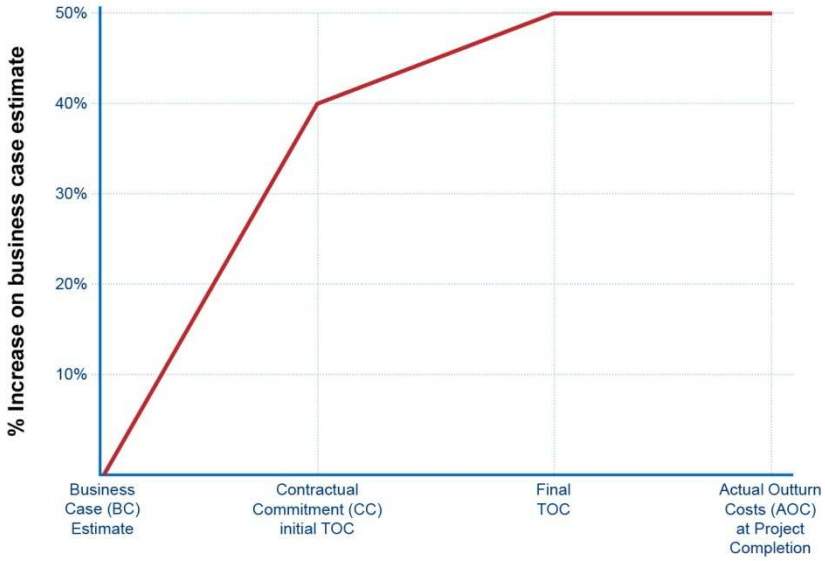


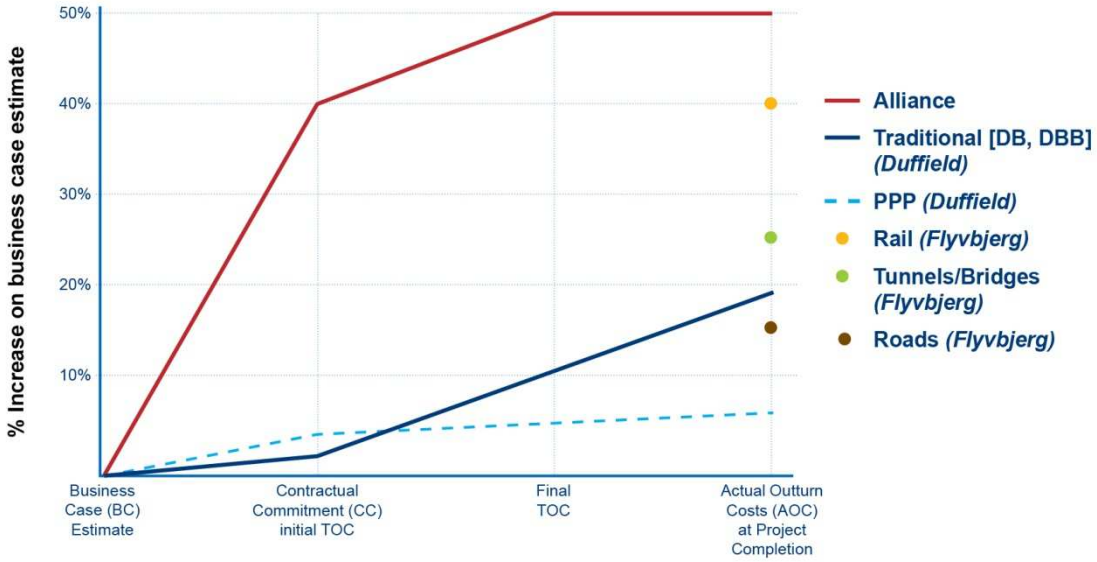
Figure 3: Simplified Alliance Lifecycle – Indicative Steps and Key Milestones

Figure 4: Observed Cost Uplift Over The 14 Alliance Delivery Cases



Observed Cost Escalation using the Alliance Delivery Method

Figure 5: Comparison Of Cost Uplift In 14 Alliance Cases Compared With Reported Cost Uplifts Of Alternative Delivery Methods And Project Types



Comparison of alliance cost escalation against other delivery methods and project types

Table 1: Summary Of Previous Research Into Cost Uplifts In Infrastructure Projects

Study	Study	Delivery Methods Addressed	Key Findings	Comments
1	Flyvbjerg et al 2002 Flyvbjerg et al (2003) Flyvbjerg et al (2004) British Dept of Transport (2004) Flyvbjerg et al (2006)	DBB, DB	▪ Significant cost uplift correlated with project type (road, rail, fixed link)	▪ Various articles using general common data source (Flyvbjerg 2003) and partial use of Mott MacDonald (2002). ▪ No comments on movement of uplift over the project lifecycle
2	Mott MacDonald (2002)	DBB, DB and PPPs	▪ Significant cost uplift correlated with project type	▪ Incorporated into Department of Transport Guidelines. ▪ Methodology criticised by Unison (2005). ▪ Mott MacDonald uses the term Optimum Bias as a description of the uplift not a causal factor per se.
3	Duffield (2008)	DBB, DB and PPPs	▪ Significant cost uplift but different between DB/DBB and PPPs	▪ Addresses movement over the project lifecycle.
4	Allen (2007)	DBB, DB and PPPs	▪ Significant cost uplift but different between DB/DBB and PPPs	
5	UK Treasury Taskforce (2000)	PPPs	▪ Addressed relative savings to other delivery methods not cost uplift per se	▪ Did not track uplift over the project lifecycle.
6	National Audit Office (2003)	DBB, DB and PPPs	▪ Addressed relative savings to other delivery methods not cost uplift per se	▪ Refer Unison critique of methodology. ▪ Did not track uplift over the project lifecycle.
7	Creedy (2006)	DBB, DB	▪ No significant correlation between delivery method and uplift. ▪ Inverse correlation of project size and uplift.	▪ PhD thesis. Cost uplift on major Highway projects in Queensland, Australia

Study	Study	Delivery Methods Addressed	Key Findings	Comments
			▪ Significant uplift in 1 in 10 projects	
8	Odeck (2004)	DBB, DB	▪ Significant uplift observed. ▪ Inverse correlation with project size. ▪ No correlation with project type (road, rail)	▪ Norwegian road projects (1992)
9	Ibbs et al (2003)	DBB, DB	▪ Cost uplift 13-15% (CC – Final) but little difference between DB and DBB)	▪ Methodology included self assessment by Project Manager

Table 2: Summary of Case Study Selection

Criteria	Case Study													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Type	Water	Road	Road	Road	Road	Rail	Rail	Rail	Water	Water	Water	Water	Water	Road
Size	>$100m	>$100m	>$100m	>$100m	>$100m	>$100m	>$100m	>$100m	>$100m	>$100m	>$100m	>$100m	>$100m	>$100m
Geographic Location	Victoria	Victoria	Qld	WA	WA	Qld	Qld	Qld	Qld	Qld	Qld	Qld	Qld	NSW
Selection Process	Non-price	Non-price	Price	Non-price	Price	Non-price	Non-price	Non-price	Non-price	Non-price	Non-price	Non-price	Non-price	Non-price
Performance Cost Time	 Poor Poor	 Good Good	 Good Good	 Good Good	 Good Good	 Good Poor	 Poor Good	 Good Good	 Good Good	 Good Poor	 Good Poor	 Good Good	 Good Good	 Good Good
Target Outturn Price (TOC) Negotiated	Negotiated	Negotiated	Tendered	Negotiated	Tendered	Negotiated	Negotiated	Negotiated	Negotiated	Negotiated	Negotiated	Negotiated	Negotiated	Negotiated

Notes:

1. Performance was defined relative to the expectations at Contractual Commitment. Hence 'poor' cost performance was where Actual Outturn Costs (AOC) exceeded the Final Target Outturn Cost (i.e. the initial TOC adjusted for variations) by more than 10%. Similarly 'poor' time performance reflected an actual project duration that was more than 10% larger than budget time.